

REMARKS

By this amendment, applicants have amended claims 10 and 19 to eliminate the "use" format. More particularly, claim 10 has been amended to be directed to a process for rebalancing electrolytes in a process for energy storage and/or power delivery, while claim 19 has been directed to be an apparatus for rebalancing electrolytes in an electrochemical apparatus for energy storage and/or power delivery.

In view of the foregoing amendments to claims 10 and 19, it is submitted these claims are directed to statutory subject matter as defined in 35 USC 101 and particularly point out and distinctly claim the subject matter which applicants regard as their invention, as required in 35 USC 112, second paragraph. Therefore, reconsideration and withdrawal of the rejections of claims 10 and 19 under 35 USC 101 and 35 USC 112, second paragraph, are requested.

Claims 1 - 19 stand rejected under 35 USC 102(b) as being anticipated by United States Patent No. 5,439,757 to Zito (Zito '757). Applicants traverse this rejection and request reconsideration thereof.

The Examiner alleges the pH compensation step of the Zito '757 process is identical to the rebalancing step (iii) of claim 1. Applicants submit that this observation is incorrect for the following reasons.

The rebalancing step of the claimed invention involves the use of an auxiliary cell that is separated into a positive chamber and a negative chamber by a cation exchange membrane. As well as preventing the bulk mixing of electrolytes, the membrane restricts the migration of anions and neutral species, and at the same time, permits the flow of cations across the membrane (see page 15, lines 14 to 20).

In the rebalancing step of the present invention, a fraction of electrolyte 1 or 2 is circulated through the positive chamber of the auxiliary cell. An electrolyte containing water is circulated through the negative chamber of the auxiliary cell. This electrolyte is free from polysulfide and free from bromine.

In the Zito '757 process, a pH compensation cell (36', 36'') may be employed. The cell is separated into a positive and a negative chamber by a microporous membrane separator 40. The separator 40 allows H<sub>2</sub> gas produced in the cell to be vented directly from the cell (see column 8, lines 44 to 49, and column 10, lines 9 to 12). In contrast to the cation selective membrane of the present invention, however, the separator 40 of Zito '757 is not cation selective. Thus, electrolyte introduced through inlet 22 is allowed to pass through the membrane.

Furthermore, the pH compensation process of the Zito '757 patent only involves a single electrolyte; a separate water-containing electrolyte is not circulated through the negative chamber of the pH compensation cell. Moreover, contrary to the presently claimed invention, there is no disclosure of using an electrolyte that is free from polysulfide and free from bromine. In fact, the only electrolyte employed in the pH compensation cell of the Zito reference is extracted from the main cell (22C, 24C).

In view of the foregoing, the process and apparatus of the present invention are not the same as the process and apparatus of the Zito '757 patent. Therefore, the claimed invention is novel over Zito.

The rebalancing step of the present invention seeks to address the disadvantages associated with the diffusion of sulfide and/or bromine ions across the cation exchange membrane of the main cell. In the Zito '757, this problem is addressed by introducing fresh electrolyte into the system (see column 5, lines 23 to

37). In contrast, the claimed invention solves this problem by rebalancing a portion of the electrolyte by oxidising the halide and/or sulfide species in the positive chamber of an auxiliary cell. The oxidation reaction is balanced by reducing water to hydrogen ions and hydroxide in the negative chamber of the auxiliary cell. To ensure that the oxidation of the halide and/or sulfide species is carried out effectively, the electrolyte in the negative chamber is free of polysulfide and bromine. If polysulfide and/or bromine is present, these species are preferentially reduced, resulting in no net change in the oxidation state of the sulfur/halide species in the system (see page 7, line 16, to page 8, line 11 of the present application).

There is nothing in Zito to suggest that the decomposition of water may be facilitated by removing bromine and polysulfide from the electrolyte employed in the pH compensation cell. In fact, Zito teaches away from this concept, as electrolyte from the main cell is introduced directly into the pH compensation cell. Thus, polysulfide and bromine are present in significant quantities in the pH compensation cells (see Figure 3A and 4). Although water may be reduced at the negative electrode, this reaction is facilitated by the use of a specially constructed cathode (see column 10, lines 21 to 38).

In view of the foregoing, there is nothing in the Zito '757 patent that would motivate a skilled person towards using the rebalancing step or means of the claimed invention. Therefore, the claimed invention would not have been obvious over Zito.

For the foregoing reasons, the Zito '757 patent does not disclose and would not have suggested the presently claimed invention.

Applicants note the Examiner has cited the Zito '197 as being pertinent to applicants' disclosure. However, since this patent was not applied in rejecting claims formerly in the application, further discussion of this patent is deemed unnecessary.

In view of the foregoing amendments and remarks, favorable reconsideration and allowance of all of the claims now in the application are requested.

To the extent necessary, applicants petition for an extension of time under 37 CFR 1.136. Please charge any shortage in the fees due in connection with the filing of this paper, including extension of time fees, to the deposit account of Antonelli, Terry, Stout & Kraus, LLP, Deposit Account No. 01-2135 (Case: 355.40958X00), and please credit any excess fees to such deposit account.

Respectfully submitted,

ANTONELLI, TERRY, STOUT & KRAUS, LLP



Alan E. Schiavelli  
Registration No. 32,087

AES/jla  
(703) 312-6600